

Average waiting time = $\frac{28.5}{8} = 3.5625 \text{ min}$

Idle time for Doctor = 0.

Motion of Spherical falling Body in Viscous Medium (Euler's Method)

By Stoke's law: $F = mg - c v$
Here $c = \frac{6\pi\eta r}{m}$

$$F = m a$$

$$m a = mg - c v$$

$$a = g - c v / m$$

- Algorithm:**
1. Start Program
 2. Define $a = g - c v / m$
 3. Feed the values of viscosity of coefficient η , radius r and mass of falling body m
 4. Feed value of g and n
($g = 9.8 \text{ m/sec}^2$; $n = 3.14152$)
 5. Calculate $c = \frac{6\pi\eta r}{m}$
 6. Give initial velocity $v(1)$, initial position $x(1)$, & initial time $t(1)$
 7. Feed the value of maximum time i.e. t_{max} & number of steps n
 8. Calculate step size $h = \frac{t_{\text{max}} - t(1)}{n}$

9. Start a loop over i varying from 1 to n with step size 1 for x , v , a and t .
Do $i = 1$ to n
 $x(i+1) = x(i) + v(i) * h$
 $v(i+1) = v(i) + a(i) * h$

$$a = g - \frac{c v(i)}{m}$$

$$t(i+1) = t(i) + h$$

Continue.

10. Start a loop varying over i varying from 1 to $n+1$ for printing of time (t), position (x), v , a .

Do 3 $i = 1, n+1$

Write (x , v) $t(i)$, $x(i)$, $v(i)$, $a(i)$

11. End of program.

Algorithm For S.H.O :- The eqⁿ for S.H.O.

$$\frac{d^2 x}{dt^2} + \frac{k}{m} x = 0$$

Put $\frac{dx}{dt} = v \rightarrow \frac{dv}{dt} = \frac{dx}{dt} = -\frac{k}{m} x$

Initial Conditions: $t = t_0 = 0$, $x = x_0$, $v = v_0 = 0$

1. Start the algorithm program
2. Feed the values of force constant (k) & mass (m)
3. Define the function $f(t, x, v) = v$
 $g(t, x, v) = -\frac{k}{m} x$
4. Feed the initial values of time (t_0), position (x_0) & velocity (v_0)
5. Choose the maximum time (t_{max})
6. Feed the number of steps n .
7. Calculate the time step size (h)
 $h = \frac{t_{\text{max}} - t_0}{n}$

8. Start a loop over i varying from 1 to n in step of 1
Use the RK-4 method to solve the equations